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PRODUCING FEED AND FLOUR FROM WHITE POTATOES WITH STEAM TUBE DRIERS

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Continued research on the process described in AIC-209, entitled "Producing Feed and Flour from White Potatoes with Steam Tube Driers," has resulted in additional information. This communication is issued to bring the information to the attention of those interested in producing potato flour by this method.

On page 2 of AIC-209, reference is made to the importance of thoroughly mixing the freshly ground potatoes with a sufficient quantity of dried recycled product to have a maximum of 43 percent moisture in the mixture going to the drier. Many distilleries have steam tube driers which could be used for this process. In most of them, the dried grains are recycled in screw conveyers. This type of conveyer, however, does not adequately mix the dried potatoes with the freshly ground potatoes. A more positive mixing action is required. A continuous paddle-type mixer conveyer with adjustable paddles has been found satisfactory.

Good mixing alone is not sufficient. Time must be allowed for the dry component to pick up moisture from the raw ground potatoes. Experience has shown that this cannot be satisfactorily accomplished, even with good mixing, in less than 4 minutes. A period of 6 or 7 minutes is preferable. If mixing is inadequate or the retention time in the mixer too short, the mixed product will be gummy and will form balls in the drier. These are objectionable in themselves because their centers remain moist. In addition, since they do not absorb enough heat in the drier, excess heat is available to act on the fines, which become darkened or even burned. With proper mixing and a sufficiently long retention time, the mixed product when squeezed in the hand will form a ball that crumbles easily and if dropped from a height of about 3 feet will break into small pieces.

When a mechanical conveyer (as contrasted with a fan) is used to recycle the dry product, a scalping screen of 8 mesh should be used between the discharge of the drier and the recycling conveyer. This will eliminate the pellets which are slow to rehydrate. The pellets should be ground. After grinding they may be used as product or for recycling, if required.

Additional experience with this process has shown that when a screen with holes 1/4-inch in diameter is used in the hammer mill for grinding the potatoes (as recommended in AIC-209), an evaporative rate above the estimated figure of 1.3 pounds of water evaporated per hour per square foot of tube heating surface may result even when flour with a moisture content of 5 percent is produced. Under favorable atmospheric conditions, 1.6 pounds of water per hour per square foot may be evaporated. It is important to recognize this potentially high evaporative rate; otherwise an insufficient quantity of potatoes may be fed to the drier, and the product may be darkened.

On page 3 of AIC-209, it is stated that "sulfur dioxide required to maintain the color is not more than 0.2 percent of the wet weight of the potatoes." Further experience has shown that 0.075 percent is adequate to maintain the color. Larger amounts may result in too much in the finished product (above 500 parts per million). When 0.075 percent sulfur dioxide is used, the pH of the slurry is generally about 5.8.

In starting large-scale operations, it is a problem to obtain a supply of dry material to mix with the raw potatoes prior to the accumulation of dried potatoes produced through operation of the drier. Such substances as corn meal or bran might possibly be used, but before substituting such material, its absorptive capacity and the time necessary for proper distribution of the moisture should be determined. Naturally, any start-up material used as a substitute for potatoes would have to be diverted into other channels. For example, it might be used for feed.

Operating a 20-foot steam tube drier under the conditions described in AIC-209, with the additional precautions given here, we found that a retention time in the drier of 25 minutes was adequate to reduce the moisture to 5 percent without scorching the material. Approximately dry, saturated steam at 100-pound gauge was used in the tubes. The drier operated at 5.5 revolutions per minute and its slope was 50 minutes. The relative humidity of the air leaving the drier was maintained at about 85 percent. Higher humidities may cause condensation at the feed end of the drier. Lower humidities indicate less efficient heat utilization.